Organic Chemistry c3444y

4th Hour Exam

Wednesday, April 19, 2000

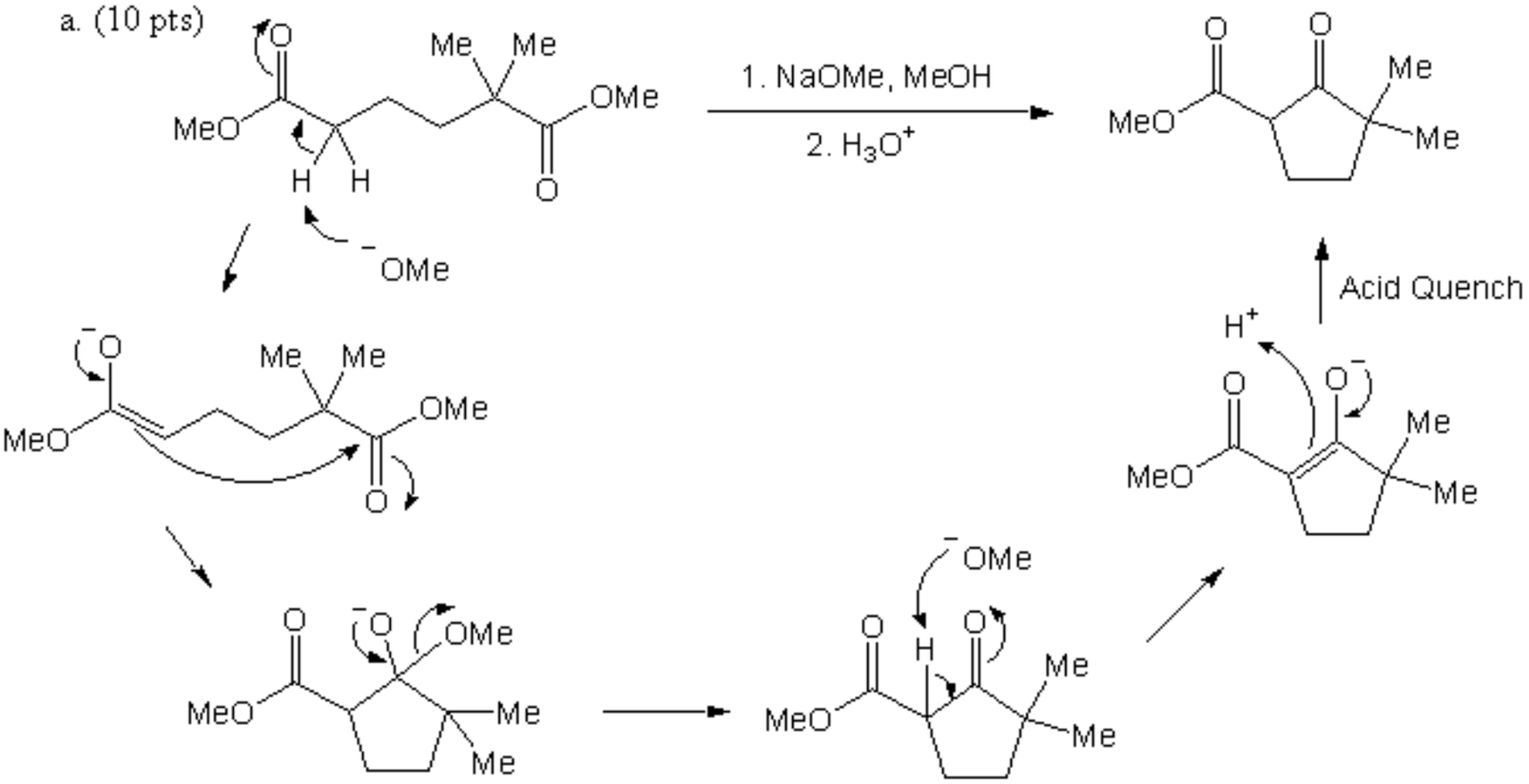
Prof. Leighton

Answer Key

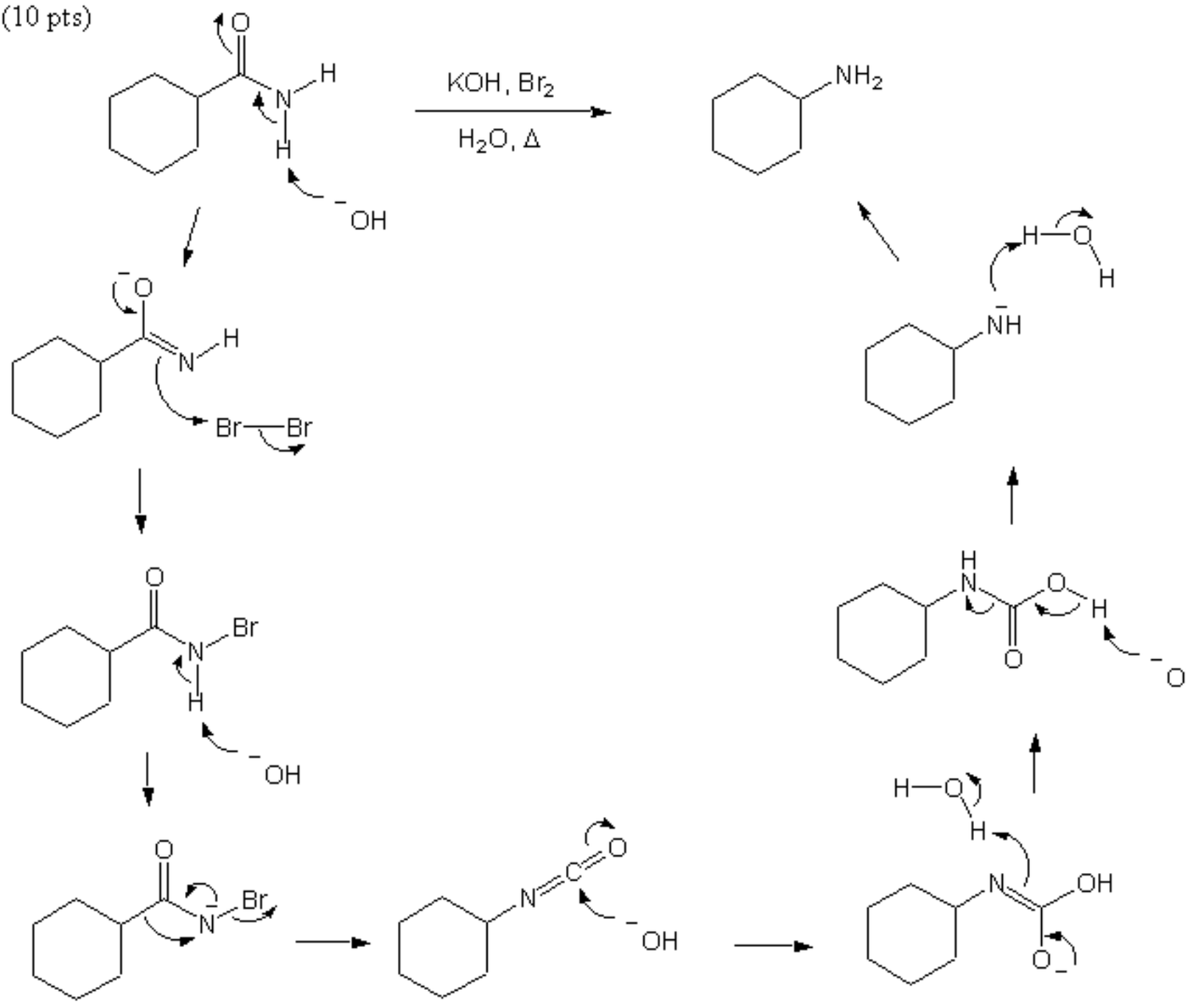
Name: _____

1. Provide detailed mechanisms for the following transformations:

a. (10 pts)



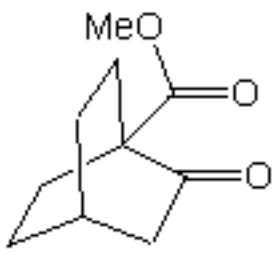
b. (10 pts)



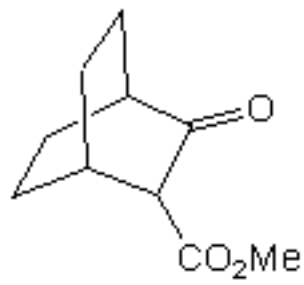
Name: _____

2. Predict the major product of the following reactions:

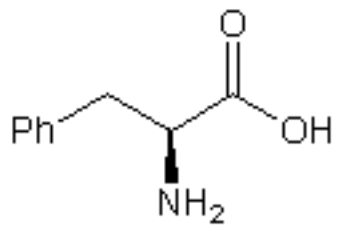
a. (9 pts)



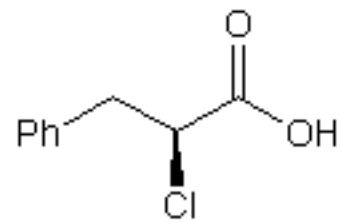
1. NaOMe, MeOH
2. H_3O^+



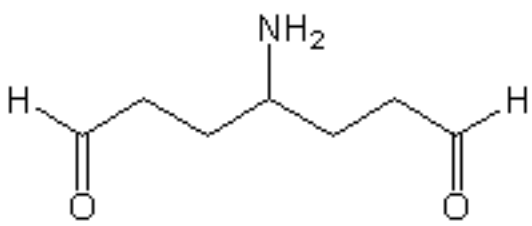
b. (8 pts)



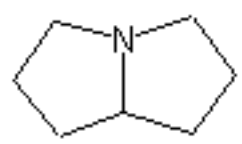
1. $NaNO_2$, H_2SO_4
2. KCl



c. (8 pts)

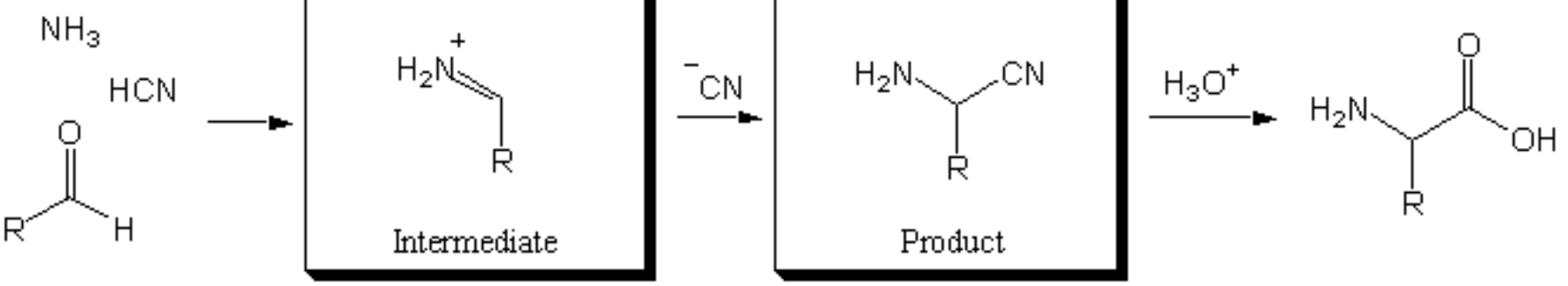


H^+, 2 equiv $NaBH_3CN$

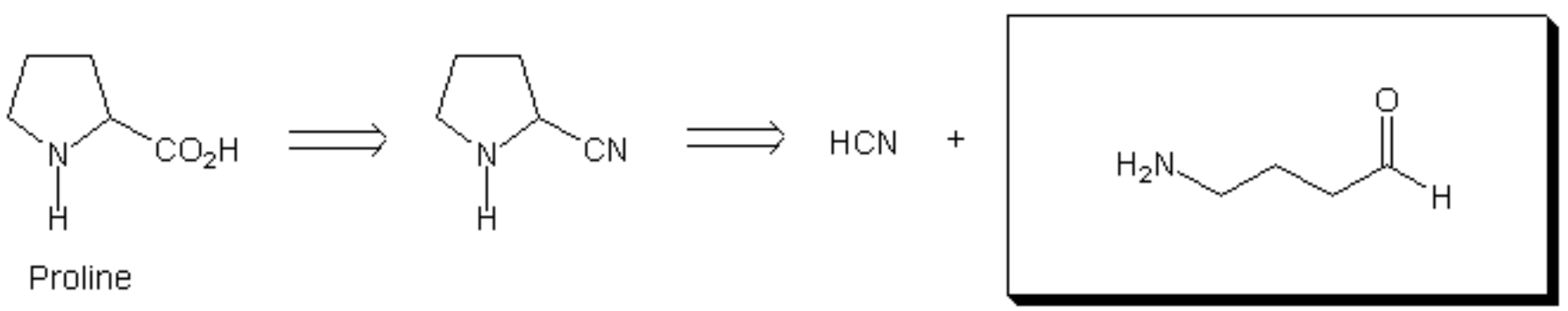


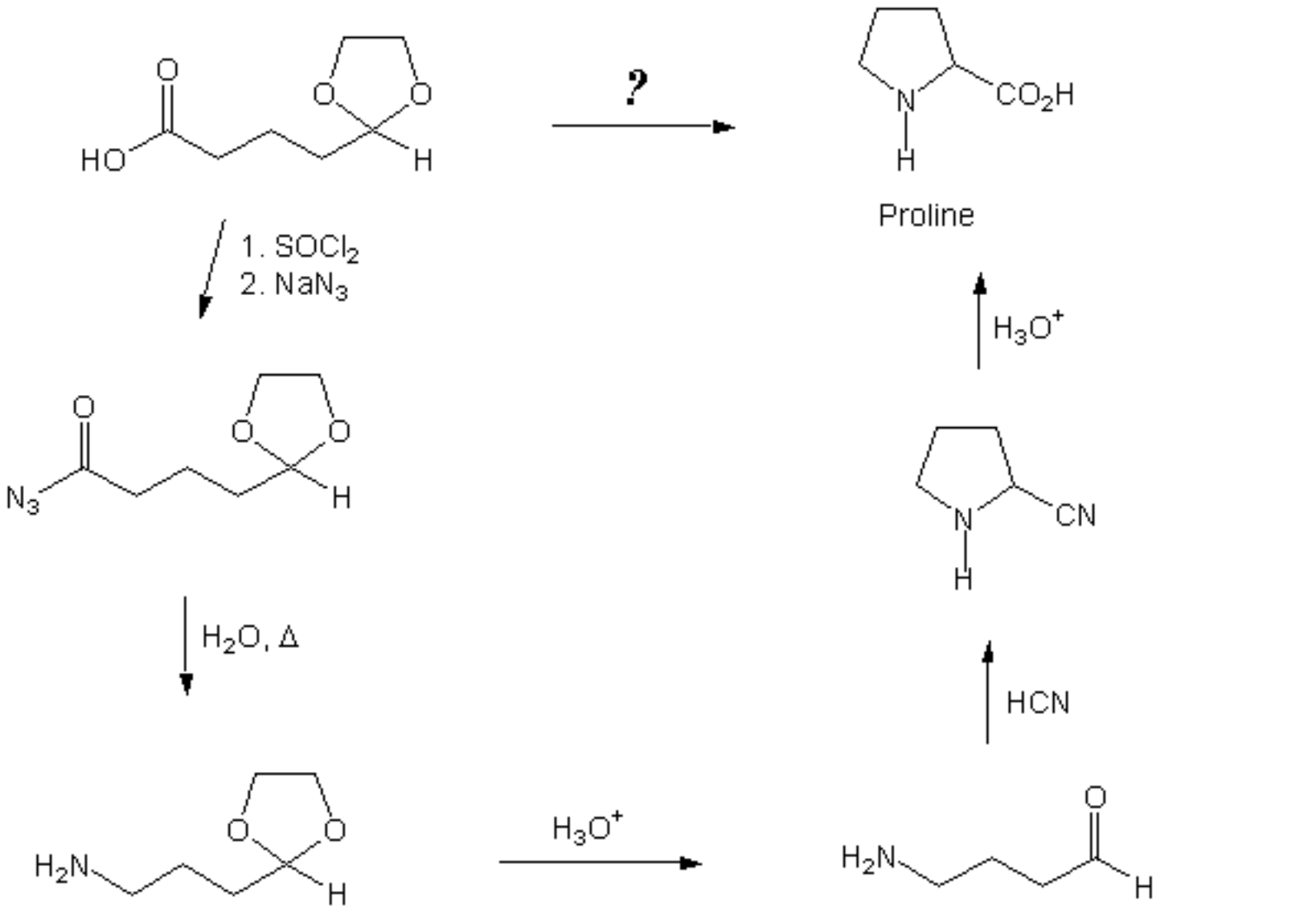
Name: _____

3. a. (6 pts) The Strecker reaction involves the combination of an amine, an aldehyde, and HCN. In the first part of the reaction the amine and aldehyde combine to form an intermediate, which reacts with cyanide in the second part of the reaction. Identify the intermediate and the product of the second part.



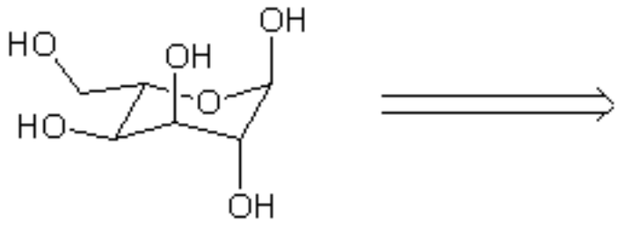
b. (14 pts) Working backwards, show the required reagent(s) for a Strecker synthesis of proline. Then show in the forward direction how you would synthesize proline from the given starting material.

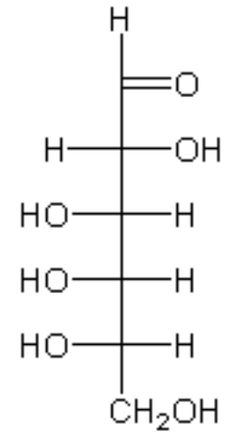




Name: _____

4. a. (10 pts) Provide a Fischer projection and a classification (*e.g.* D-ketotetrose) for the following carbohydrate:



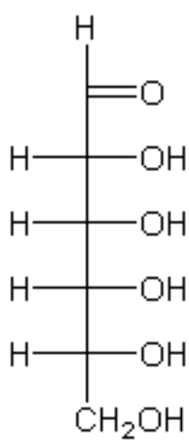


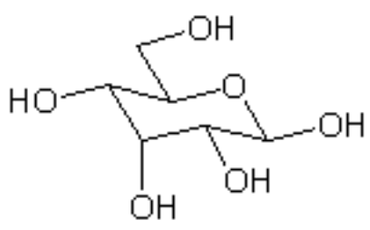
Fischer Projection

L-aldohexose

Classification

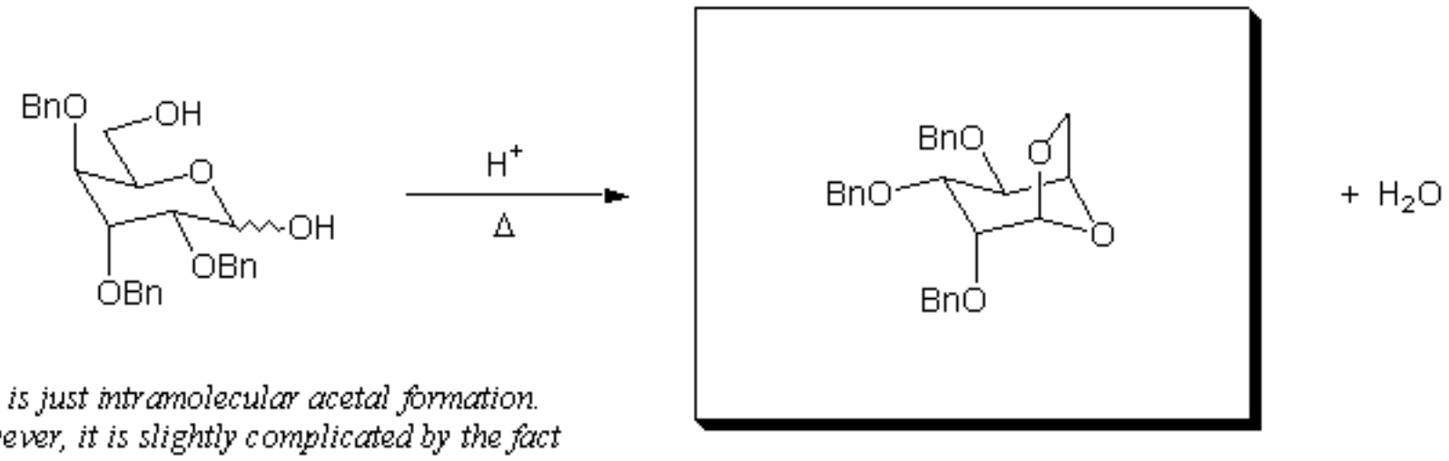
b. (10 pts) Provide a clear drawing of the most stable **β-PYRANOSE** form of the following ketohexose.



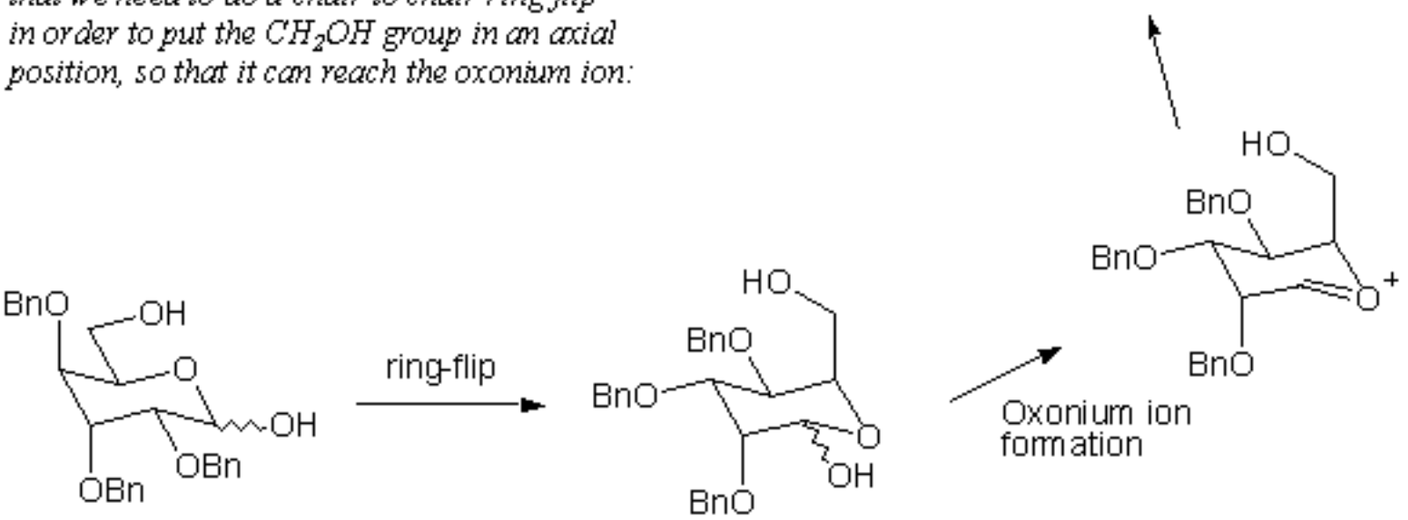


Name: _____

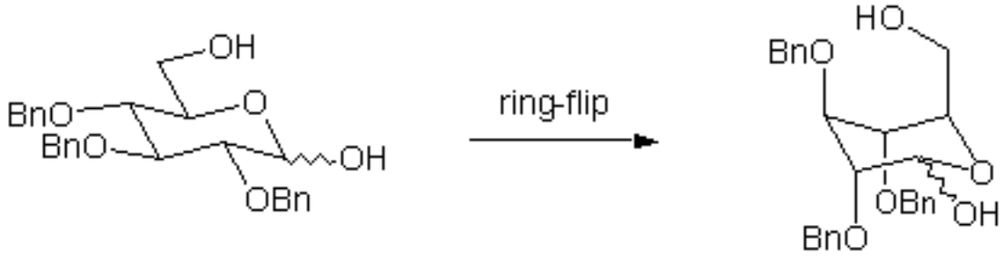
5. a. (10 pts) When the illustrated carbohydrate is heated in acid, a new compound is produced along with H_2O. The reaction does not proceed if the primary alcohol is also protected as a benzyl ether. Show the structure of this new compound.



This is just intramolecular acetal formation. However, it is slightly complicated by the fact that we need to do a chair to chair ring flip in order to put the CH_2OH group in an axial position, so that it can reach the oxonium ion:



b. (5 pts) Why might you expect this process to be more difficult with the carbohydrate shown here, than with the one shown above?



Here too, a chair to chair ring flip would be required, but in this case such a ring flip would lead to a chair form wherein every group is axial! It would certainly be reasonable to expect that this might make the process more difficult in this case.